

Combating CA-MRSA in Physical Education, Sports, and Dance

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This potentially deadly bacterial infection demands attention.

For years, methicillin-resistant *Staphylococcus aureus* (MRSA), commonly known as "staph," had been believed to be a problem limited to hospitals. However, a new strain of antibiotic-resistant *Staphylococcus* termed "community-associated" or "community-acquired" MRSA (CA-MRSA) is infecting the sport community at alarming rates (Centers for Disease Control and Prevention [CDC], 2003). Infections have been noted at all levels of sport—including high school, college, and even professional sports—as well as at local health facilities. Left untreated, this infection can spread and cause life-altering damage, the loss of a limb, and in extreme cases, death.

What Is CA-MRSA?

Community-associated MRSA is a bacterial infection that will initially present itself as a small bump. It is often mistaken for a "bug bite" or an ingrown hair. This bump will rapidly grow in size and will eventually expand into an abscess that will be extremely red and may have pustule drainage (figure 1). Some abscesses look like enlarged pimples or clusters of pimple "heads" called carbuncles or, in laymen's terms, a "boil" (Gorwitz et al., 2006).

In 2005, the CDC (2005) noted,

...outbreaks of MRSA in community settings [i.e., CA-MRSA] have been associated with strains that have some unique microbiologic and genetic properties compared with the traditional hospital-based MRSA strains, suggesting some biologic properties (e.g., virulence factors) may allow the community strains to spread more easily....

A recent study (Labandeira-Rey, 2007) confirmed this speculation, identifying Panton-Valentine Leukocidin (PVL) toxin, secreted by CA-MRSA, as "a major virulence factor both in pneumonia and in deep-seated skin infections" (Bowden & Vandenesch, 2007, ¶ 3).

Potential for Death

This infection can result in death, in some cases, if not treated. Substantial attention to CA-MRSA began only in the late 1990s, with the deaths of four children in Minnesota and North Dakota (CDC, 1999). Subsequently, Texas Children's Hospital reported 14 cases of severe community-associated *S. aureus* infections in adolescents (12 were CA-MRSA), resulting in three deaths, between August 2002 and January 2004 (Gonzalez et al., 2005). One of the youths who died had acquired the infection from a football injury. Another football player, at Lycoming College in Pennsylvania, died of CA-MRSA in 2003 (Mihoces, 2006).

The potential lethality of the disease seems to have increased recently with the emergence of PVL toxin in most strains of CA-MRSA, in contrast to a previous rate of only five percent (Science Media Centre, 2007), and with this toxin's role in the often-fatal necrotizing pneumonia (Labandeira-Rey, 2007). Recent research has also

Figure 1. Example of CA-MRSA Infection

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found an association between CA-MRSA-caused pneumonia and influenza, which seems to act as a trigger (CDC, 2007). The CDC received reports of 15 such cases, including four deaths, during the 2003-04 influenza season. Another 10 cases, including six deaths, occurred in Louisiana and Georgia from December 2006 to January 2007.

Where Is CA-MRSA?

The most recent group to report CA-MRSA is the athletic population. Athletes who participate in sports that involve close skin-to-skin contact, such as wrestling, are more likely to have outbreaks of CA-MRSA infections. To take a less obvious example, an outbreak of CA-MRSA among members on a fencing team could be caused by sharing the sensor wire worn under the clothing. In sports such as football, turf burns and "strawberries" are easy entry points for many bacteria. The spread of CA-MRSA is often hastened by poor hygiene, sharing towels, direct skin-to-skin contact, and the close quarters of a locker room. Crowded environments with poor hygiene, such as prisons, have also reported instances of CA-MRSA. In professional baseball, Sammy Sosa, a player for the Baltimore Orioles, missed 16 games during the 2005 season due to a CA-MRSA infection in his foot.

High school dancers, too, have contracted CA-MRSA. A large outbreak in Pasadena, California, in 2002, included members of a high school dance team (Garay, 2002), and in 2004 a dance team member in Illinois was infected (Borchardt, 2005).

Because physically active persons are particularly prone to such an infection, physical educators, coaches, and dance educators are among those who need to educate themselves about CA-MRSA. Therefore, this article will present some basic information about the prevention, diagnosis, and treatment of CA-MRSA, particularly in reference to physical education, sport, and dance settings.

Who Carries CA-MRSA?

Healthy individuals can carry *Staphylococcus* bacteria in their nose or on their skin. However, the conditions need to be right for the bacteria to invade the body, grow, and cause an infection (Perriello, 2006). Any break of the skin, including

a bite, scrape, scratch, razor burn, or cut allows easier entry of these bacteria into the body and can result in a localized skin infection.

How CA-MRSA Spreads

The infection can spread to people who have close contact with an infected person. However, spreading may also occur through indirect contact, by touching objects (e.g., towels, wound dressings, clothes, weightlifting equipment, playground equipment, and sports equipment) contaminated with CA-MRSA. There are several precautionary measures that instructors may take in their physical education class or dance class, or in an athletic setting, to reduce the potential spread of CA-MRSA (List, 2005).

Precautions

Since some of the risk factors identified with CA-MRSA outbreaks are item sharing, close physical contact, open wounds, and poor hygiene, there are several control measures to consider to prevent its spread.

1. Clean all equipment that comes in contact with bare skin and multiple individuals after each use or at least twice a week (List, 2005). A study showed that the use of a formula with 70 percent denatured ethanol that contains one percent glycerol as an emollient helped to prevent the spread of CA-MRSA (Fairclough, 2005). Using a solution of one part bleach to 10 parts water in a spray bottle can be a cheap alternative (Arnold, 1995).
2. Encourage students who keep clothing in their gym lockers to have their clothing laundered after each use (Elston, 2006).
3. Encourage students to report any suspicious skin sore or boil to a teacher or to the school nurse immediately. Do not allow students to pick at sores (Romano, Lu, & Holtom, 2006).
4. Athletes involved in close-contact sports should have a total body check done by the appropriate athletic personnel before any game, match, or tournament (Romano et al., 2006).
5. Discourage students from sharing items that may be contaminated with wound drainage. This includes towels, clothing, shoes, razors, roll-on deodorant, and athletic equipment that touches the skin (Gorwitz et al., 2006).
6. All individuals should maintain good general hygiene by bathing regularly (Gorwitz et al., 2006).
7. Keep cuts and abrasions clean and covered, especially those that have drainage. If it is impossible for an individual to keep a wound covered, do not allow that individual to participate in physical activities until cleared by a healthcare professional. Individuals with an infection involving pustule drainage should be excluded from participation in physical activities until no drainage is present and the infected site can be adequately covered with a bandage and clothing (Gorwitz et al., 2006).
8. Clean hands regularly with soap and water, as this is one of the most important components in preventing the

Table 1. Tips on Washing Your Hands

1. Wet hands with clean running water and apply soap. Warm water is best if available
2. Rub hands together in order to form lather. Scrub all surfaces for 20 seconds. How long is 20 seconds?
Sing Happy Birthday twice in your head for a good estimate!
3. Rinse hands under running water
4. Dry hands with a paper towel or air dryer. Turn off faucet with paper towel if they are available
5. When soap is not available, use an alcohol-based gel to clean your hands
6. When using alcohol-based hand sanitizer, rub hands together until all surfaces of hands are dry

Source: Centers for Disease Control and Prevention (2006)

spread of germs (Gorwitz et al., 2006). Tips on hand washing can be found in table 1. In addition, an alcohol-based hand gel can be substituted if soap and water are not readily available (Gorwitz et al., 2006).

Prevention

A major component in preventing the spread of CA-MRSA is to educate the students, parents, faculty, and staff. The education process should be done at the beginning of each school year or before sport participation. The education session could be facilitated by a local healthcare professional such as a doctor or certified athletic trainer during a school assembly, on the first day of physical education or dance class, or during team meetings. An information sheet that includes pictures of what CA-MRSA looks like and a list of the signs and symptoms of the infection should be sent home to parents. Other ideas to promote CA-MRSA education include making signs with pictures for locker rooms, designing a bulletin board in high-traffic areas, and posting warning information on the school's web site.

Suspected Cases

If a case of CA-MRSA is suspected, the student must cease sport participation and be removed from activities where he or she would have direct skin-to-skin contact with other students. If the suspected CA-MRSA area has drainage, it should be covered with a clean, sterile dressing until the student can be seen by a physician. Early detection and referral are imperative in preventing the spread and potential outbreak of CA-MRSA (List, 2005).

Diagnosis and Treatment of MRSA

Nonprofessionals often misdiagnose CA-MRSA as a spider bite or an insect sting. Many people ignore the "bite" and only clean the wound slightly, if at all. Other people pick and squeeze the site, or worse yet, will stick homemade "sterilized needles" into the wound to try to extract drainage. Although CA-MRSA can make pustule material, it can also wall itself off and produce little to no drainage.

A proper diagnosis of CA-MRSA is made by a small biopsy of skin or pus taken with a swab from the infected area and grown in a laboratory. The culture can be tested to determine

which antibiotic will be effective for treating the infection (List 2005). Many of the newest medicines are proving to be ineffective, while some of the tetracycline drugs are very effective when treating CA-MRSA (Zhanel et al., 2004). In addition to antibiotics, the "gold standard" of care for an abscess is incision and drainage by a healthcare professional with daily cleaning and bandage changes until the wound has healed completely (Elston, 2006).

When a Student Has CA-MRSA

If a student tests positive for CA-MRSA, no one should panic. Everything the student may have come into contact with must be disinfected, including all clothing, pads, towels, and equipment. All students should be told to report any suspicious sores or boils to the school nurse, teachers, coaches, or parents. Before the infected student can regain participation privileges, he or she must have a signed medical release from the doctor. Unfortunately, it is common for a student to have a recurrence of CA-MRSA. If this happens, it is suggested that the entire team have nasal cultures taken to identify the carrier of CA-MRSA (Schnirring, 2004).

If an outbreak of CA-MRSA is detected at school, external help should be sought from a doctor, the county health department, or a local hospital. They can help with the appropriate treatment of the infected students and help to stop the spread of CA-MRSA.

Antimicrobial coatings are also being developed to protect people from CA-MRSA in large community areas. The coating can cover an entire locker room or dressing room, turf fields, and medical facilities. At this time, there is limited research on these coatings, and the available research is product specific; however, the coatings show promise for the future fight against CA-MRSA.

Conclusion

Left undetected, CA-MRSA can be a deadly bacterial infection. Educating sport and dance participants on detecting an infection early and on appropriate treatment are integral components in avoiding a CA-MRSA outbreak within school facilities. It is imperative that appropriate preventative measures be implemented to ensure the safety of all students.

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It is always better to be proactive than reactive in dealing with a health threat.

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